



14. Mathematics for Engineers (PH025IU)

Course designation	<i>This course develops a synthetic view of mathematical knowledge and skills in analyzing and modeling Signals and Systems. Covers review of fundamental harmonic analysis, with applications in Electronics, Control, Communications and Signal processing.</i>
Semester(s) in which the course is taught	1, 2, summer semester
Person responsible for the course	Dr. Trần Nguyễn Lâm
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, assignment.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 170 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 50 Private study including examination preparation, specified in hours: 120
Credit points/ECTS	4 credits/6.16 ECTS
Required and recommended prerequisites for joining the course	Previous course: Calculus 2 (MA003IU)



Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Show the understanding of complex analysis, determinants, and matrices.
	Skill	CLO2. Apply skills to solve problems in science and engineering.
	Attitude	CLO3. Recognize the need for further self-learning in mathematics.



Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduction); T (Teaching); U (Utilization)</p>		
	Topic	Weight	Level
	Part I Complex analysis Functions of a complex variable: limits and continuity	2	I, T,U
	Singular points, Poles. Laurent series. Line integrals. Cauchy's integral theorem.	2	I, T,U
	Residues. Residue theorem. Evaluation of definite integrals	1	I, T,U
	Application of the residue theorem to compute the Fourier and Laplace transform	2	I, T,U
	Part II Determinants and matrices Introduction to determinants	1	I, T,U
	Matrices: definition; special type of matrices; addition, multiplication; transposition, inversion	2	I, T,U
	Systems of linear equations; existence of solution; unicity condition; Gauss-Jordan elimination; homogeneous linear systems	2	I, T,U
	Eigenvalues and eigenvectors of a matrix	2	I, T,U
Applications of Eigen technique to solve linear problems.	1	I, T,U	
Examination forms	Exam		



Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	[1] Lecture Notes [2] K.T. Tang, <i>Mathematical Methods for Engineers and Scientists 1</i> ", Springer Verlag, 2007.